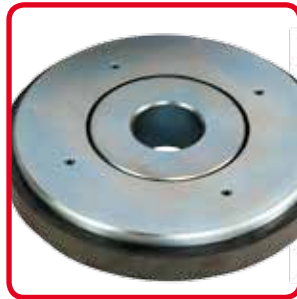


# Magnetic Assemblies for Audio Applications

Optimising performance and cost through innovation and design



# Magnetic Design Solutions for Acoustics

## Competitive edge performance

With over 100 years of experience, Eclipse Magnetics designs, produces and supplies **magnets** and **magnetic assembly solutions** to satisfy the wide ranging magnetic performance requirements and specifications of loudspeaker, horn and microphone applications.

Eclipse Magnetics understands the need for our customers to produce commercially viable, high performance audio products. To achieve this we work with your engineers and designers to provide the perfect solution for your magnetic assembly and material needs. We design the assembly to factor in, the coil space, air gap size, required magnet shape; we specify magnetic materials to fit your requirements. We can develop bespoke designs which fulfil your specifications.

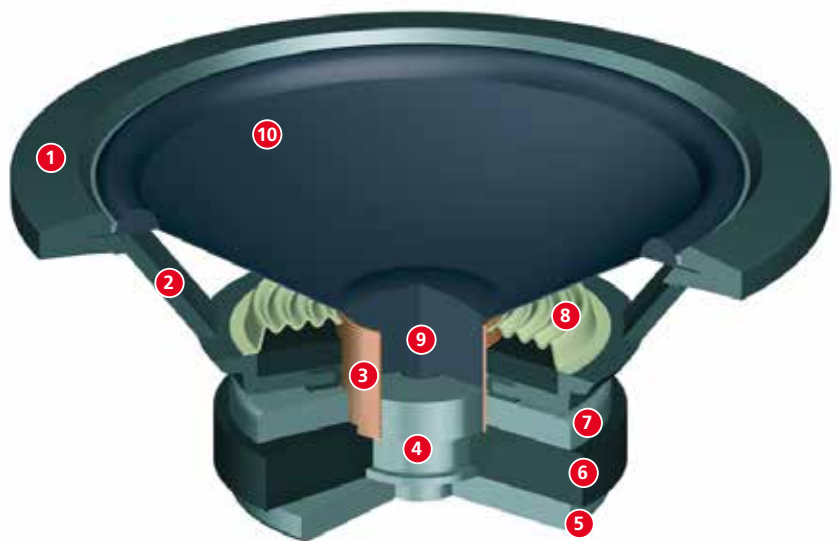
## Complete magnetic assemblies

Magnetic components form a critical part of virtually all audio systems. Whether you have a completed design and need a reliable long term supply partner or you require design assistance and technical support, Eclipse Magnetics can help with your assemblies and sub-assemblies for acoustic applications, such as:-

- Loudspeakers
- Transducers
- Speaker Drivers
- Horns, Sounders
- Sub-woofer, Woofer
- Car speakers
- Public address systems
- Voice Coil Motors
- Tweeters, Super-tweeters
- Microphones

### A typical Loudspeaker assembly

- 1 Gasket
- 2 Housing
- 3 Voice coil windings
- 4 Pole
- 5 Rear plate
- 6 Magnet
- 7 Front plate
- 8 Suspension
- 9 Voice coil former
- 10 Cone/Diaphragm



# Design and Innovation

At Eclipse Magnetics we design to meet the requirements of your project e.g. speaker size, weight, cost, or quality of magnet. Our experience in magnetic solutions allow us to focus on aspects such as field strength in air gap, pole piece flux concentration, leakage reduction, temperature ranges, to design the optimum magnetic assembly.



## Optimised product development

We work with your designers to help achieve increased efficiencies including weight reduction, miniaturisation, higher efficiency, greater field strength, cost reduction and even reduction of rare earth material use; with an aim to provide you with a commercially viable cost effective solution, without compromising sound quality performance.

## Our services include;

- **Prototyping & Validation**
- **3D CAD Design**
- **3D FEA (Finite Element Analysis)**
- **Micron accurate precision manufacture**
- **Wealth of material types and grades**
- **China based joint venture production facility – cost optimisation**
- **“Just-In-Time” delivery schedules and stock-holding**
- **Mutual Non-Disclosure Agreements and documentation**



# Competitive Edge Magnetic Assemblies

## Ferromagnetic Plates and Central Pole

The top and bottom plates and any linking steelworks that surround the permanent magnet are a crucial assembly feature that will impact sound performance.

## Magnetic Components

The magnet is a crucial component in a speaker or audio device assembly. We advise on the material type, field strength, size and construction, which all impacts on the sound quality, tone, durability and cost.

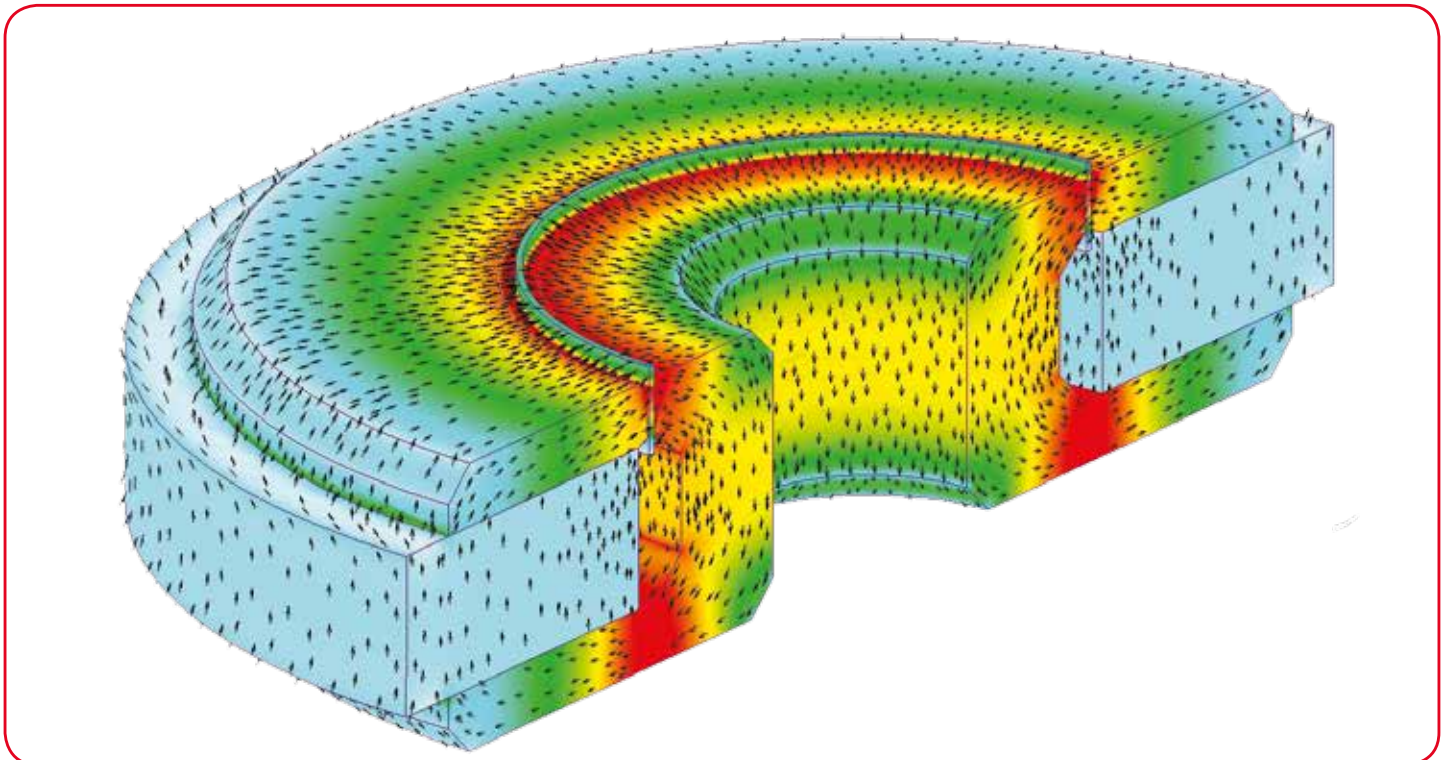
## Assembly Air Gap

The air gap is designed to be small enough to fit the voice coil, without the coil touching the ferromagnetic plates but still allow the magnetic field to drive the voice call.

## Voice Coil

The voice coil is typically constructed of wound copper wire and is designed to fit precisely in the air gap. By specifying different shapes and materials you can change the sensitivity of the voice coil, resulting in changes to speaker performance.

## Magnetic field strength within a ring magnet assembly



Our specialised FEA software allows us to simulate the magnetic properties of a loudspeaker driver. This enables us to prototype and validate designs, to provide a solution that meets your requirements.

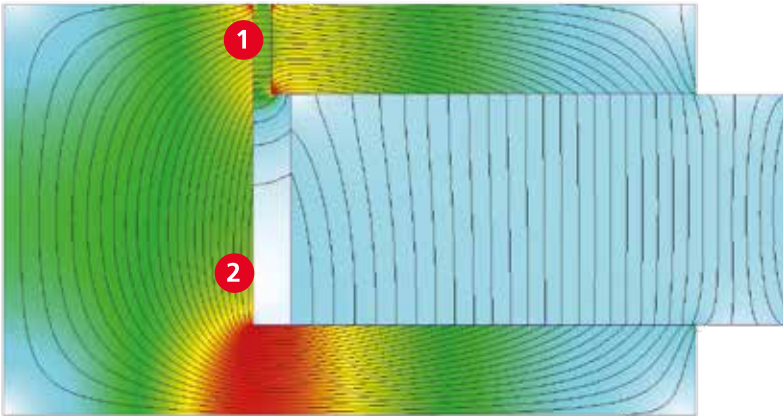
# Optimised Solutions



## Case Study Optimised Magnetic Assembly

Eclipse Magnetics was given the brief to redesign a completed speaker driver. The objective included increasing performance levels of the driver without increasing the size or weight of the magnetic materials used.

### Original Design



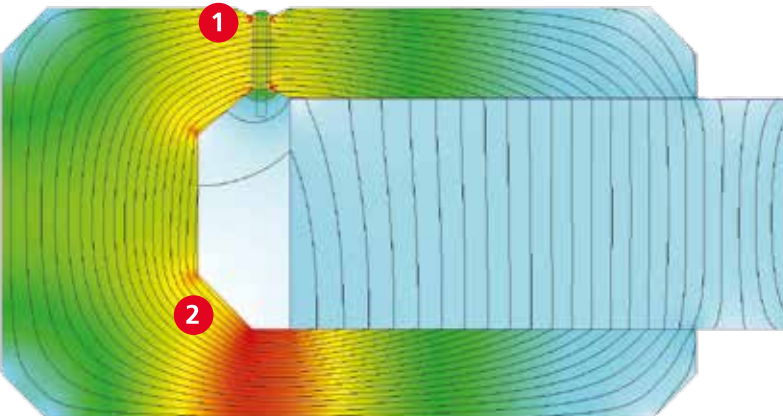
- 1 This design produces a limited magnetic field strength in the air gap
- 2 The inefficient design of the plates allow for field leakage and overly large mild steel volume

#### Magnetic Field Strength



Our solution was to redesign the shape of the ferromagnetic plates. By using FEA software, we created a prototype design with tapered edges on the ferromagnetic plate. This increased the magnetic field density within the air gap, providing increased sensitivity and performance of the assembly, with minimal weight changes or change to the magnetic materials used.

### Optimised Design



- 1 Increased field strength within the air gap, for increased performance by tapering the plates
- 2 Shaping the ferromagnetic plates reduces magnetic field leakage, concentrates the magnetic field in the air gap and reduces the overall weight while boosting air gap field strength

#### Magnetic Field Strength



# A Choice of Magnetic Materials

The magnet is one of the most crucial components in a speaker or audio device assembly. The type, strength, size, and construction impacts on the sound performance, weight, and cost of your product. We have access to the latest magnetic technology and latest high performance materials, and through our joint venture facility in China we can ensure optimised costs.

## Neodymium Iron Boron, NdFeB, (Neo)

Neodymium magnets are the most powerful of the Rare Earth (RE) magnets. Size for size, there is no better maximum performance magnet.

- Ideal for miniaturisation
- Maximum power density of the magnetic field within the air gap
- Ranges from N27 up to N54
- Temperature ranges of up to +230°C



## Ferrite, Ceramic

Ferrite magnets, also known as Ceramic magnets, are popular in larger driver assemblies.

- High corrosion resistance
- Lower cost
- Easier to produce in large rings
- Phenomenal long term performance in damp conditions
- Ideal in marine sounder applications

Where longevity in arduous conditions and cost are major considerations, ferrite magnets are a viable solution.



## Alnico

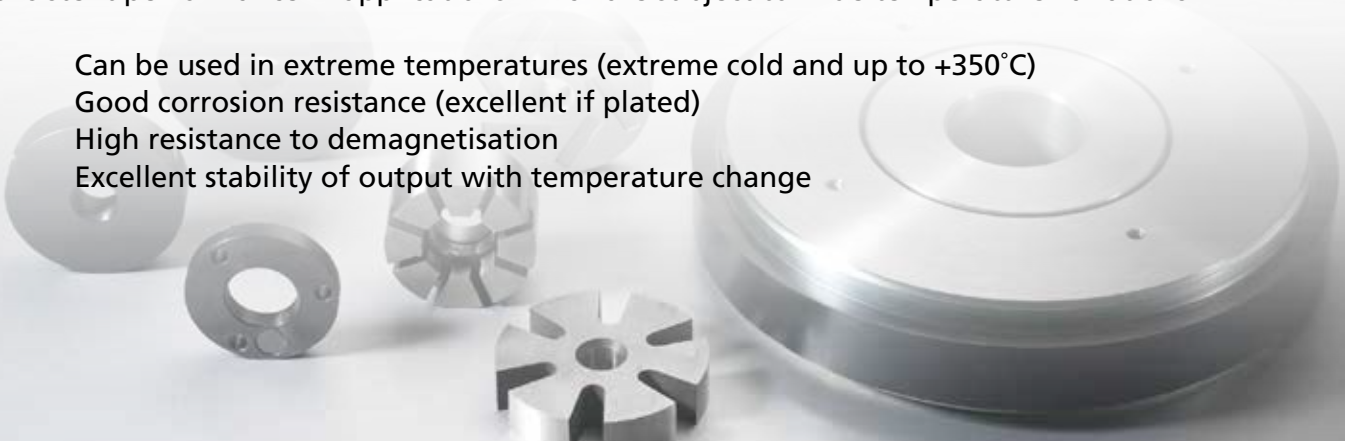
Alnico drivers tend to be longer in axial length to allow for higher performance and reducing demagnetising effects.

- Easy to magnetise or deliberately weaken – easy to fine tune the air gap magnetic field strength
- Good corrosion resistance – ideal for external applications
- Extremely resistant to high temperatures
- Can be produced in complex shapes or with more complex magnetic fields

## Samarium Cobalt, SmCo

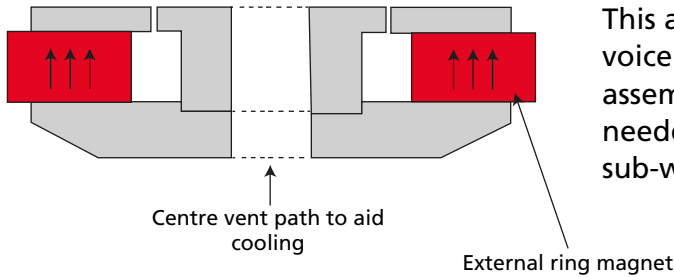
Samarium Cobalt is a weaker variety of “Rare Earth” magnet (in comparison to NdFeB) but gives a more consistent performance in applications which are subject to wide temperature variations.

- Can be used in extreme temperatures (extreme cold and up to +350°C)
- Good corrosion resistance (excellent if plated)
- High resistance to demagnetisation
- Excellent stability of output with temperature change



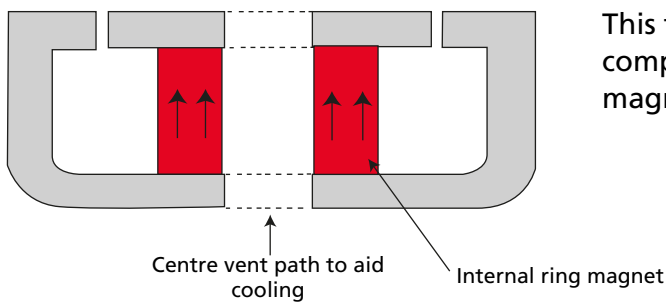
# Typical Magnetic Assembly Examples

## External ring magnet



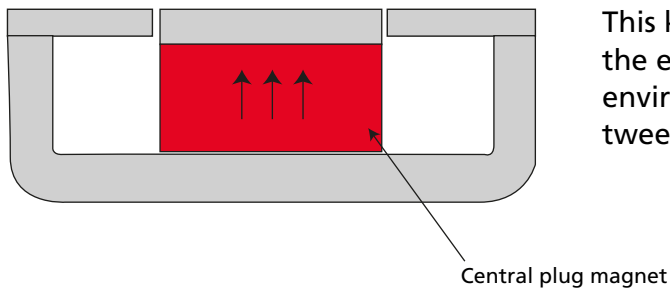
This assembly has an external ring magnet driving the voice coil. This assembly is perfect for ferrite as the assembly can accommodate the larger size magnets needed to drive the assembly. Often used in woofers and sub-woofers.

## Internal ring magnet



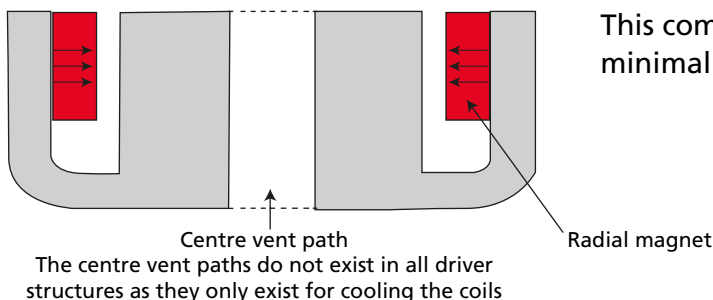
This type of assembly has an internal ring magnet. Usually comprised of Alnico or Neodymium, high strength small magnets allow for miniaturisation.

## Plug/tapered magnet



This kind of assembly allows for minimal leakage of the external magnetic field. This is ideal for sensitive environments. Compact designs are possible such as in tweeters.

## Radial magnet



This complex assembly uses a radial magnet which has minimal external magnetic field leakage.

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